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THE VARIATIONS OF ARENARIA PEPLOIDES IN AMERICA.

M. L. Fernald.

It has long seemed to the writer that the fleshy tufted plant of the sea-sands of New England and eastern Canada, which passes with us as *Arenaria peploides* L. or, with those who prefer to separate it from *Arenaria*, as *Ammodenia peploides* (L.) Rupr., is doubtfully identical with the slender plant of northern Europe and our arctic and sub-arctic regions. In habit our plant differs strikingly from the European type but, owing to the infrequency of its fruiting upon the New England coast, the writer has been forced until the present to leave its status unsettled. Recently, however, he has collected fruiting material on beaches of the lower St. Lawrence, and this with fully mature fruit sent by Miss Mary Robinson from Nantucket shows that not only in habit, foliage, and inflorescence, but in the size of the fruit and the surface of the seed, is our plant readily distinguished from typical *A. peploides* of Linnaeus.

In fact, if compared only with the typical European *Arenaria peploides*, our plant would be called with slight hesitation a perfectly distinct endemic species; but a study of *A. peploides* from various parts of the northern hemisphere leads to the conviction that it is best treated as a circumpolar species with a number of more or less defined tendencies or varieties in different regions. In North America there are five pronounced variations of which the New England and eastern Canadian plant is the most extreme.

The Linnean *Arenaria peploides*[1] of northern Europe is a small plant with comparatively slender, though fleshy, procumbent, rather

[1] L. Sp. Pl. 423 (1753).

freely branching, densely tufted stems which (in the dried plants) are 1.5–3 mm. in diameter and rising only 0.5–2 dm. above the sand. Its leaves are somewhat fleshy, ovate to elliptic, 0.5–2 cm. long; its flowers, to quote the description of Bentham and Hooker, are "few, on short pedicels, in small, leafy, terminal cymes, usually more or less unisexual" [1]; its globose thick-walled capsules, "about the size of a small pea," [2] are by measurement 6–8 mm. in diameter, containing few rather lustrous large dark brown seeds. This small plant with definite short cymes occurs in America, so far as known to the writer, only upon the coast of Labrador and in arctic Alaska.

On the shores of Behring Sea and the North Pacific from the Aleutian Islands south to Japan occurs an extremely large plant, coarser in all its parts than the true *Arenaria peploides*, but with well developed cymes as in the typical form. This large North Pacific plant seems to be, however, not a mere luxuriant development of *A. peploides*, but a well defined variety, for the walls of its capsules are comparatively thin and so translucent (in the dried specimens) as to show clearly the forms of the very lustrous light reddish-brown seeds. This large variety was also collected by the late Rev. A. C. Waghorne on the west coast of Newfoundland; and, in view of the known affinity of the flora of western Newfoundland and Gaspé with that of the North Pacific region, may be looked for elsewhere about the Gulf of St. Lawrence.

The common plant from north of the Straits of Belle Isle, on the coast of Labrador, seems in every way identical with the Greenland *Arenaria peploides*, var. *diffusa* Hornem.,[3] which is depressed, with even more slender branches than in the European type, these often purple-tinged and very slightly if at all thickened; and which has only 1–3 flowers in the upper axils instead of definite cymes. The var. *diffusa* of Greenland and Labrador in its matted habit and slender stems superficially resembles luxuriant plants of *Stellaria humifusa* rather than the coarse rigid plant with which we are familiar farther south on the Atlantic coast or a somewhat less extreme variation which occurs on the Pacific coast from the Aleutian Islands to Washington and Japan.

This common plant of the Pacific coast from southern Alaska

[1] B & H. Brit. Fl. ed. 7, 68 (1900).
[2] Syme, Engl. Bot. ii, 107 (1873).
[3] Hornem. Oec. Pl. ed. 3, 501 (1821).

southward was distinguished by Hooker as *Arenaria peploides*, β. *major* [1] and it was later described by Torrey and Gray as a distinct species, *Honckenya oblongifolia*.[2] Hooker's description is very brief but the citation of the type from De Fuca's Straits as well as a fragment of the material preserved in the Gray Herbarium indicates that his plant is identical with that described by Torrey and Gray. *A. peploides*, var. *major* is clearly separable from true *A. peploides* with ovate leaves and well developed cymes by its thicker, more fleshy stems (in dried plants varying from 2–4 mm. in diameter), its more elongate branches with few axillary slender-pedicelled flowers, its larger leaves, and the narrower acuminate sepals.

The common plant of the Atlantic coast from the mouth of the St. Lawrence southward is even more fleshy than the Pacific coast var. *major*, the elongate, erect or strongly ascending, rigid branches ("large as a goose quill" according to William Oakes [3]) measuring in dried specimens 2.5–6 mm. in thickness. Its leaves are oblong or oblong-ovate, very thick and coriaceous, and scarcely narrowed at base. Its few flowers are borne in the upper axils on very short thick pedicels; its ovate sepals are obtuse or at most subacute; the thick-walled capsules 8–12 mm. in diameter; and the mature seeds dark brown, distinctly papillose and scarcely lustrous. Superficially this rigid thick-stemmed plant of the Atlantic seaboard suggests the Pacific coast *Arenaria peploides*, var. *major*, but that well distinguished plant has the thinner larger leaves narrowed at base, the flowers slender-pediceled, and the narrowly ovate or lanceolate sepals acuminate.

At first thought one is surprised that those keen-eyed observers of our flora, Michaux and Pursh, did not point out the striking dissimilarity of our plant and the true *Arenaria peploides* with which they must have had some experience in Europe; but apparently neither of them had much familiarity with the coastal sands of the northeastern states and Canada. Michaux does not mention *A. peploides*, and Pursh knew it as an American plant only from a Labrador specimen in the Banksian herbarium.[4] In 1818 Nuttall listed *A. peploides* in his Genera,[5] as growing "on the sea-coast," and took up separately

[1] Fl. Bor.-Am. i. 102 (1830).
[2] T. & G. Fl. i. 176 (1838).
[3] Oakes's manuscript notes in Gray Herbarium.
[4] Pursh, Fl. i. 317 (1814).
[5] Nutt. Gen. i. 290 (1818).

the problematical *Holosteum succulentum* of Linnaeus,[1] saying of it "Probably nothing more than *Arenaria peploides*, which grows on the sea-coast of New-Jersey, as this *Holosteum* cannot now be found." In 1824, Jacob Bigelow published a good account of our plant (as *A. peploides*) from sandy beaches "particularly at Plumb island, near Newburyport where it forms large crowded tufts resembling islets;"[3] and in the same year Torrey[4] described it clearly from New Jersey, Long Island, and Massachusetts, likewise as *A. peploides*. In 1836 Rafinesque, treating this section of *Arenaria* as a genus, *Adenarium*, considered it as having two species:

"1. *A.* [*denarium*] *peploides*, Raf. *Arenaria*, do. L. Suffruticose, leaves fleshy ovate acute subserrate.— Europe, Seashore, seen dry.

"2. *A. Maritimum* Raf. *Holosteum succulentum* L. *Arenaria peploides* of Amer. botanists. Herbaceous dichotome, leaves fleshy ovate obtuse entire petals obovate — Atlantic shores of N. America from New England to New Jersey, in sand, flowers white, vernal, terminal and in forks. Seen alive. Nuttal refers to this, the American *Holosteum* of L. who must have mistaken the glands for trifid petals, but he says leaves elliptic. Figures Autikon. Ic. n. sp."[5]

There is no doubt that Rafinesque had our common representative of *Arenaria peploides*; but his reference to it (following Nuttall) of *Holosteum succulentum* L. was unfortunate, for there is strong evidence that the latter plant, which was based by Linnaeus on Colden's description of *Alsine foliis ellipticis succulentis*, could not have been an *Arenaria*.[6] So far as a search of literature has shown the disposition of our coastal fleshy *Arenaria* by Nuttall, Bigelow, and Torrey has since passed unchallenged, except by Rafinesque. That it is clearly different from the little tufted plant of Europe with its small cyme of flowers, small capsule, and more lustrous seed, there can be no question; but in view of its close similarity on the one hand to the more northern *A. peploides*, var. *diffusa*, on the other to the Pacific coast var. *major*, it is evidently to be considered a pronounced geographic tendency or

[1] L. Sp. i. 88 (1753).
[2] Nutt. Gen. i. 89 (1818).
[3] Bigel. Fl. Bost. ed. 2, 181 (1824).
[4] Torr. Fl. N. and Mid. U. S. 453 (1824).
[5] Raf. New Fl. pt. 1, 62 (1836).
[6] In Colden's original description (Pl. Cold. Noveb. 86, no. 9) the "*petala* quinque, calyce minora, ad unguem bifida" indicates, as Torrey has already suggested (Fl. N. and Mid. U. S. 159) "that this long lost species is nothing more than STELLARIA *media*, in which the flowers are frequently triandrous, and the leaves a little fleshy."

variety of a broadly distributed polar type rather than a distinct species. But since the name *maritima* has twice been used for species in the genus *Arenaria* and as a varietal designation would be quite meaningless for a local variation of a uniformly maritime [1] species, a more appropriate name is proposed for the plant now first treated as a variety.

The American variations of *Arenaria peploides* may be briefly defined as follows.

* Flowers few to many in terminal leafy cymes.

ARENARIA PEPLOIDES L. Rooting and usually much branched deep in the sand; the leafy branches of the season procumbent, 0.5–2 dm. high, usually much forked, somewhat fleshy, 1.5–3 mm. in diameter (when dry): leaves ovate or elliptic, somewhat fleshy, 0.5–2 cm. long: flowers few, on short pedicels, in small terminal leafy cymes, usually more or less unisexual; sepals 4–5 mm. long, ovate, obtuse or acutish: capsule globose, thick-walled, 6–8 mm. in diameter: seeds compressed-pyriform, 3–4 mm. long, dark brown, somewhat lustrous and rugulose.— Sp. Pl. 423 (1753); Eng. Bot. iii. t. 189 (1794); Pursh, Fl. i. 317 (1814); and subsequent Am. auth. in small part only. *Alsine peploides* Crantz, Inst. ii. 406 (1766). *Arenaria portulacea* Lam. Fl. Fr. iii. 38 (1778). *Honkenya peploides* Ehrh. Beitr. ii. 181 (1788); Reichenb. Ic. Fl. Germ. v. t. 213, fig. 3670 — as *Honckenya* (1841). *Arenaria littoralis* Salisb. Prodr. 299 (1796). *Halianthus peploides* Fries, Fl. Hall. 75 (1817). *Adenarium marina* S. F. Gray, Nat. Arr. Brit. Pl. ii. 545 (1821). *Adenarium peploides* Raf. New Fl. pt. 1, 62 (1836). *Merckia peploides* G. Don. Gen. Syst. i. 441 (1831). *Honkeneja peploides, a. latifolia* Fenzl in Ledeb. Fl. Ross. i. 358 (1842). *Ammadenia peploides* Rupr. in Beitr. Pfl. Russ. Reich. ii. 25 (1845).— Coastal sands of boreal regions. In America known only from Labrador and arctic Alaska.

Var. **maxima**, n. var., ramis subsimplicibus vel aliquid furcatis 1.2–3.5 dm. altis paulo succulentibus 2–4 mm. crassis; foliis late lanceolatis vel elliptico-ovatis basin versus angustatis aliquid carnosis, eis mediae partis 2–4.5 cm. longis 1–2 cm. latis; cymis multifloris; sepalis ovatis vel ovato-lanceolatis 5–7 mm. longis; capsula 7–9 mm. diametro tenui (siccatate translucenti); seminibus levibus et lucidis pallide rufo-brunneis.

Branches subsimple or slightly forked, 1.2–3.5 dm. high, slightly succulent, 2–4 mm. thick: leaves broadly lanceolate to elliptic-ovate, narrowed at base, slightly fleshy, the middle ones 2–4.5 cm. long, 1–2 cm. broad: cymes several-flowered: sepals ovate to ovate-lan-

[1] The reference in the Synoptical Flora to an imperfect specimen from Yellowstone Lake as perhaps belonging to *Arenaria peploides* was based on an immature plant which does not satisfactorily match any known form of this species.

ceolate, 5–7 mm. long: capsule 7–9 mm. in diameter, thin-walled (translucent in dried specimens): seeds smooth and lustrous, light reddish-brown.— ALEUTIAN ISLANDS, tide-margin at Nazan Bay, Atka, July 26, 1907 (*E. C. Van Dyke*, no. 237); Behring Island, July 15, 1891 (*N. Grebnitsky*, Herb. Geol. Surv. Can.): KAMTCHATKA, Ochotsk Sea, 1853–56 (*J. Small*, Herb. U. S. N. Pacific Exped.): JAPAN, near Hokodate, Hokkaido (*Albrecht*, 1861); Zenibako, June, 1883, Oshamambo, July, 1883 (*S. Takenobu*): NEWFOUNDLAND seashore, Wild Cove, July 10, 1896 (*A. C. Waghorne*).

* * Flowers few, terminal or axillary but not in distinct cymes.

Var. DIFFUSA Hornem. Dwarf, matted: the flaccid depressed branches scarcely fleshy, 3–20 cm. long, 1–2 mm. thick, often purple-tinged: leaves ovate to elliptic, narrowed at base, slightly fleshy, 0.5–1.5 cm. long: flowers 1–3, on short slender pedicels: sepals lance-ovate, acute, 5–7 mm. long: capsules as in the typical form.— Oec. Pl. ed. 3, 501 (1821). *Halianthus peploides*, var. *diffusa* Lange, Conspect. Fl. Groenl. pt. 1, 26 (1880). *Arenaria diffusa* Wormskj. ex Lange, Consp. Fl. Groenl. pt. 2, 243 (1887). *Honckenya peploides*, α *diffusa* Kruuse, Med. om Grönl. xxx. 229 (1906).— Greenland and arctic America, south to the Straits of Belle Isle, Labrador.

Var. MAJOR Hook. Branches fleshy, subsimple to freely forked, 1–4 dm. long, 2–4 mm. thick: leaves elliptic or oblong, somewhat fleshy, narrowed at base, the middle ones 2–3.5 cm. long: flowers few, axillary, on slender often elongate (6–25 mm. long) pedicels: sepals lanceolate or lance-ovate, acute, 6–8 mm. long: capsule 9–12 mm. in diameter: seeds lustrous.— Fl. Bor.-Am. i. 102 (1830). *Honckenya oblongifolia* Torr. & Gray, Fl. i. 176 (1838). *Arenaria sitchensis* Dietr. Syn. Pl. ii. 1565 (1840). *Honkeneja peploides*, β. *oblongifolia* Fenzl in Lædeb. Fl. Ross. i. 358 (1842). *Halianthus peploides*, var. *oblongifolia* Hartm. Skand. Fl. ed. 11, 244 (1879). *Ammodenia major* Heller, Cat. N. Am. Pl. 4 (1898). *Alsine peploides*, subsp. *oblongifolia* Gürke in Richter, Pl. Eu. ii. 265 (1899). *Ammodenia peploides major* Piper, Contrib. U. S. Nat. Herb. xi. 260 (1906).— Pacific coast, from the Aleutian Islands and Kamtchatka south to Washington and Japan; said by Hartman to occur in Scandinavia.

Var. **robusta**, n. nom. Branches erect or ascending, very fleshy, simple or sparingly forked, 1.5–5 dm. high, 2.5–6 mm. thick: leaves oblong or oblong-ovate, scarcely narrowed at base, very thick and coriaceous, the middle ones 1–3 cm. long: flowers few, axillary or from the upper forks, on short (3–7 mm. long) thick pedicels: sepals ovate, obtuse or subacute: capsule thick-walled, 8–12 mm. in diameter: seeds dark brown, distinctly papillose, only slightly lustrous.— *A. peploides* Nutt. Gen. i. 290 (1818); Bigel. Fl. Bost. ed. 2, 181 (1824); Torr. Fl. N. and Mid. U. S. 453 (1824); and most subsequent Am. auth. *Holosteum succulentum* Nutt. Gen. i. 89 (1818)

not L. Sp. Pl. i. 88 (1753). *Adenarium maritimum* Raf. New Fl. pt. 1, 62 (1836) except as to synonym *Holosteum succulentum* L. *Honkenya peploides* Gray, Gen. ii. 31, t. 110 (1849).— Atlantic coast from Saguenay Co., Quebec to New Jersey; and reported southward to Virginia.

Gray Herbarium.

ANOTHER HYBRID BETWEEN A WHITE AND A BLUE VIOLET.

Ezra Brainerd.

Viola cucullata × primulifolia. (*V. lavandulacea* Bicknell, Torreya, iv. 130.) This hybrid I discussed briefly in Rhodora, viii. 52, remarking on its evident relationship to *V. cucullata*, and querying if the other parent might not be such a form of *V. emarginata* as I had in cultivation from Washington, D. C., with strongly decurrent base and leaf-outline of *V. primulifolia*. Soon afterward Mr. Bicknell in conversation stated that he had thought the doubtful parent might be the real white-flowered *V. primulifolia*. I replied there was no precedent for so remote a cross in Viola; it must be considered quite improbable. But Mr. Forbes's recent discovery of *V. Brittoniana* × *lanceolata* [1] throws a new light on the problem. A critical study of his plants leaves one in no doubt as to the correctness of his conclusions; the presence in them of stolons can be accounted for only on the hypothesis of a sexual union between a purple-flowered and a common white violet. The precedent being established, we are prepared to weigh the evidence sustaining Mr. Bicknell's opinion as to the parentage of his *V. lavandulacea*.

The marks of *V. cucullata* are indisputable, especially the long-auricled slender cleistogamous flowers, the short glabrous spurred petal, the knobbed beard on the lateral petals, and the finally acuminate leaves. The marks of *V. primulifolia* are also conspicuous, namely, — the truncate and decurrent base of the leaf, its obscurely crenulate margin, its numerous nearly parallel veins diverging from the midrib,

[1] Rhodora, xi. 14, Jan. 1909.